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## MUNITIONS AND EXPLOSIVES OF CONCERN HAZARD ASSESSMENT FOR 4825 GLENBROOK ROAD

### R.1 INTRODUCTION

Parsons has been tasked by the U.S. Army Corps of Engineers, Baltimore District (CENAB) to prepare a munitions and explosives of concern (MEC) hazard assessment (HA) for the property at 4825 Glenbrook Road, which is located within the Spring Valley Formerly Used Defense Site. The purpose of this MEC HA is to assess qualitatively the potential explosive hazards to human receptors associated with complete MEC exposure pathways at the property. *Note that this MEC HA does **not** address or otherwise evaluate potential risks related to chemical agent posed by chemical warfare materiel (CWM) that might be present at the site.* This document contains a detailed description of the MEC HA conducted for the 4825 Glenbrook Road property, including the information and assumptions used for this assessment.

### R.2 SITE HISTORY AND PREVIOUS DISCOVERIES

The 4825 Glenbrook Road property is located in the south central portion of the Spring Valley Formerly Used Defense Site (SVFUDS), which is located in the northwest section of Washington, D.C. The property is a single family, detached residential dwelling owned by American University (AU). Further information on the general history of the SVFUDS and more detailed information about 4825 Glenbrook Road is presented in the report to which this document is appended.

As part of the investigations conducted at the SVFUDS, a geophysical investigation of 4825 Glenbrook Road in February 1999 was performed concurrently with an investigation at the adjacent property (4801 Glenbrook Road). This investigation did not identify geophysical features representative of pits or trenches, but the results of investigation were considered to be inconclusive because of the amount of construction debris present and so a test pit investigation was recommended. This recommendation was also supported by the results of a year-long investigation at the neighboring 4801 Glenbrook Road property that began in March 1999 revealed the presence of two burial pits, which were found to contain 299 munitions-related items. Subsequently, a test pit investigation was initiated at 4825 Glenbrook Road in May 2001 during which 23 test pits and two trenches were excavated. All of the test pits were excavated to a depth of approximately 6 feet below the historic 1918 ground surface, or the maximum depth achievable by equipment. There were no significant findings in any of the test pits except for Test Pit 23, which was located at the property boundary with 4801 Glenbrook Road (USACE 2007).

During the investigation of Test Pit 23, which ultimately crossed the 4825 and 4801 Glenbrook Road property boundaries and measured approximately 32 feet by 17 feet by 14 feet in depth, a total of 18 CWM items, 73 MEC items, and 333 munitions debris (MD) items were recovered. MEC items recovered from the pit included explosively configured MkII 75mm chemical projectiles, 75mm shrapnel rounds, and 4.7-inch shrapnel rounds. All of the MEC

items found met the definition of discarded military munitions (DMM) (i.e., none were classified as unexploded ordnance [UXO]). (*The definitions of these terms are provided in Subchapter R.9 of this document.*) Multiple 3-inch Stokes mortars also were recovered. None of these latter items were explosively configured and were not classified as MEC. The southern part of Test Pit 23 (the portion located at 4801 Glenbrook Road) was excavated and cleared; however, items were observed under a retaining wall in the northern portion (4825 Glenbrook Road) of Test Pit 23 in close proximity to the 4825 Glenbrook Road house foundation. The excavation was suspended and the northern portion of Test Pit 23 was temporarily backfilled in March 2002 because of right-of entry issues (USACE 2010).

The excavation of Test Pit 23, which was renamed Burial Pit 3, resumed at 4825 Glenbrook Road in October 2007. This multi-phased investigation continued through March 2009. During each phase, material from various extensions of the original pit footprint was assessed and removed. By the time the excavation was complete, six additional CWM items, 22 MEC items, and 80 MD items were removed from Burial Pit 3, bringing the total items excavated from the pit to 24 CWM items, 95 MEC items, and 413 MD items.

An additional test pit investigation was proposed at 4825 Glenbrook Road to identify potential burial pits or trenches at the property. This investigation began in March 2009 to excavate the proposed 51 test pits (48 low probability and 3 high probability). The test pit locations were selected to provide a 95 percent confidence of locating burial pits or trenches with dimensions of not less than 10 feet by 20 feet. The investigation ceased in April 2010 when arsenic trichloride was detected in one closed cavity container removed from one of the pits. While this test pit investigation was not completed, it resulted in the identification of several areas of soil contamination at the property and recovery of thirty-seven CWM items, two MEC items, and three MD items. Of the 51 test pits planned for excavation, 42 were completed when operations ceased in April 2010. During the sewer line restoration in 2011, one CWM item and one MD were recovered.

In summary, a total of 62 CWM items, 97 MEC items, and 417 MD items were recovered from the investigation activities performed to date at the 4825 Glenbrook Road.

Figure A-1 shows the munitions response site (MRS) boundary, test pit locations, the status of investigations to date, and where MEC and munitions debris have been found at the 4825 Glenbrook Road property. Note that MEC have been found at depths from 1 to 9 feet below ground surface (bgs) at 4825 Glenbrook Road during these investigations.

### **R.3 EXPLOSIVE HAZARDS AND HAZARD ASSESSMENT**

An explosive hazard exists at a site if there is a potentially complete MEC exposure pathway. A potentially complete MEC exposure pathway is present any time a receptor can come near or into contact with MEC and interact with the item in a manner that might result in its detonation. There are three elements of a potentially complete MEC exposure pathway: (1) a source of MEC, (2) a receptor, and (3) the potential for interaction between the MEC source and the receptor. All three of these elements must be present for a potentially complete MEC exposure pathway to exist.

The qualitative hazard assessment technique presented here follows the MEC HA method, which provides an assessment of the acute explosive hazards associated with remaining MEC at a MRS by analyzing site-specific conditions and human issues that affect the likelihood that a MEC accident will occur. The MEC HA method focuses on hazards to human receptors and does not directly address environmental or ecological concerns that might be associated with MEC. The process for conducting the MEC HA is described in the MEC HA interim guidance document (U.S. Environmental Protection Agency [USEPA] 2008) and uses input data based on historical documentation, field observations, and the results of previous studies and removal actions. The MEC HA interim guidance was developed by the Technical Working Group for Hazard Assessment, which included representatives from the Department of Defense (DoD), the U.S. Department of the Interior, the USEPA, and various states and tribes. The DoD has encouraged use of this method on a trial basis (DoD 2009).

The MEC HA method reflects the basic difference between assessing acute hazards from exposure to MEC and assessing chronic environmental risks from exposure to potential contaminants, such as munitions constituents (MC). An explosive hazard can result in immediate injury or death; therefore, risks from explosive hazards are evaluated either as being present or not present. If the potential for an encounter with MEC exists, then the potential that the encounter may result in injury or death also exists. Conversely, if the potential presence of MEC at an MRS can be ruled out as a result of field investigations, then no explosive hazards are present, and a MEC HA is not necessary.

This MEC HA was conducted to evaluate the baseline conditions for the site with regard to explosive hazards. These baseline evaluations provide the basis for the evaluation and implementation of effective management response alternatives in a feasibility study (FS) for this property. The MEC HA also supports hazard communication among stakeholders by organizing site information in a consistent manner for the hazard management decision-making process. However, the MEC HA does not provide a quantitative assessment of MEC hazards and is not used to determine whether or not further action is necessary at a site.

#### **R.4 DEFINING THE AREAS TO BE ASSESSED**

The MEC HA is focused on each MRS at a site. However, the MEC-related characteristics of discrete areas within an MRS may differ with regard to the ordnance types and quantities, land uses, receptors, and other factors. If these factors vary significantly, the qualitative MEC hazards associated with the discrete areas are likely to differ. For example, the characteristics of a range impact area and its safety fan are likely to differ with regard to the amount of MEC potentially present or different land use activities may exist that create differing potentials for MEC interaction with human receptors within a large maneuver area.

Different MEC hazards may result in different response alternatives being appropriate for these discrete areas; consequently, an MRS may be subdivided into two or more distinct “assessment areas,” each of which will be the subject of a separate MEC HA for purposes of hazard assessment and subsequent response alternative evaluation. However, if an MRS is likely to be the subject of only one response alternative (e.g., the MRS is small), the MRS may be evaluated as a single assessment area, despite the potential for differing MEC-related

characteristics. In this event, the most conservative MEC HA input factors (see below) are selected for purposes of the MEC HA. A determination regarding assessment areas is made for each MRS subject to a MEC HA.

## **R.5 OVERVIEW OF MEC HA INPUT FACTORS**

Under the MEC HA method, the potential MEC hazards are evaluated qualitatively for each MRS or assessment area by evaluating three primary factors. These primary factors are related to the three critical elements noted previously are:

- *Severity*: the potential consequences of the effect on a human receptor should a MEC item detonate;
- *Accessibility*: the likelihood that a human receptor will come into contact with a MEC item; and
- *Sensitivity*: the likelihood that a MEC item will detonate if a human receptor interacts with the item.

To complete the baseline MEC HA for each MRS/assessment area, the input factors are reviewed and suitable categories (baseline, surface MEC cleanup, or subsurface MEC cleanup) are selected based on historical documentation and field observations. The input factors for the MEC HA method are highlighted below (USEPA 2008):

*Energetic Material Type*: This factor describes the general type of energetic material associated with the munition(s) known or suspected to be present within the MRS or assessment area. The six possible categories for this factor, ranging from the most to least potentially hazardous, are “high explosives and low explosive fillers in fragmenting rounds,” “white phosphorus,” “pyrotechnics,” “propellants,” “spotting charges,” and “incendiaries.” The category selected for each MRS or assessment area is based on the energetic material with the greatest potential explosive hazard known or suspected to be present.

*Location of Additional Human Receptors*: Human receptors other than the individual who causes a detonation may be exposed to overpressure and/or fragmentation hazards from the detonation of MEC. This factor describes whether or not there are additional human receptors located within the MRS/assessment area or within the explosive safety quantity-distance (ESQD) arc surrounding the MRS/assessment area. The two possible categories for this factor are “inside the MRS or inside the ESQD arc surrounding the MRS” and “outside the ESQD arc.”

*Site Accessibility*: The site accessibility factor describes how easily human receptors can gain access to the MRS or assessment area and takes into account the various barriers to entry that might be present. The four possible categories of site accessibility range from “full accessibility” (i.e., a site with no barriers to entry) to “very limited accessibility” (i.e., a site with guarded chain link fences or terrain that requires special skills and equipment to access). This factor differs from the Potential Contact Hours factor (see below) and does not include or

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account for land use controls (LUCs) that might restrict site access. The effects of LUCs are assessed in the FS alternatives assessment.

*Potential Contact Hours:* This factor accounts for the amount of time receptors spend within the MRS or assessment area during which they might come into contact with MEC and intentionally or unintentionally cause a detonation. Both the number of receptors and the amount of time each receptor spends in the MRS/assessment area are used to calculate the total “receptor-hours/year.” This total is calculated for all activities that might result in potential MEC interaction and there are four possible categories, ranging from “many hours” ( $\geq 1,000,000$  receptor-hours/year) to “very few hours” ( $< 10,000$  receptor-hours/year).

*Amount of MEC:* This input factor describes the relative quantity of MEC anticipated to remain within the MRS or assessment area as a result of past munitions-related activities. For example, a greater quantity of MEC would be expected to be present in a former target area than at a former firing point. The nine possible categories for this factor, from the largest to the least anticipated amount of MEC, range from “target area” and “OB/OD area,” through “burial pit” and “firing point,” to “storage” and “explosives-related industrial facility.”

*Minimum MEC Depth Relative to the Maximum Receptor Intrusive Depth:* This factor indicates whether the MEC in the MRS or assessment area are located at depths that might be reached by the anticipated human receptor activities. For the baseline MEC HA, the four possible categories concern whether or not MEC are located at the surface and in the subsurface within the MRS or assessment area, or whether MEC are present in the subsurface only, and whether or not the receptor intrusive depth overlaps with this MEC location.

*Migration Potential:* The migration potential factor addresses the likelihood that MEC in the MRS or assessment area might migrate by natural processes (e.g., erosion or frost heave) thereby increasing the chance of subsequent exposure to potential human receptors. The two possible categories for this factor are “possible” and “unlikely.”

*MEC Classification:* This factor accounts for how easily a human receptor might cause a detonation of the MEC and relates directly to the MEC sensitivity. The six possible categories for this factor, ranging from the highest to lowest sensitivity (and explosive hazard) are “sensitive UXO,” “other UXO,” “fuzed sensitive DMM,” “fuzed DMM,” “unfuzed DMM,” and “bulk explosives.” The selection of category for each MRS or assessment area is made using the MEC with the highest potential sensitivity known or suspected to be present and, where uncertainty exists, conservative assumptions are made and documented. For example, UXO is always assumed to be present within a known target area, whether or not the investigation uncovers UXO at the site.

*MEC Size:* This factor indicates how easy it is for a typical human receptor to move the MEC item(s) present within the MRS or assessment area. For example, an individual is considerably more likely to pick up or accidentally kick a hand grenade than a 200-lb. bomb. The basic assumption used in this category is that MEC weighing 90-lbs or more is unlikely to be moved without the use of special equipment. Based on this assumption, the two possible categories for this factor are “small” (i.e., items weighing less than 90-lbs.) and “large” (items

weighing 90-lbs. or more). The selection of category for each MRS or assessment area is based on the MEC known or suspected to be present with the highest potential to be moved (i.e., the smallest item).

Each category for each of the MEC HA input factors has an assigned score that relates to the relative contributions of the different input factors to the overall MEC hazard. These scores were developed by the Technical Working Group for HA. These factors and their associated scores for the baseline condition are provided in Table R.1a while the detailed technical basis for the scores assigned is provided in the MEC HA interim guidance document (USEPA 2008). Scores for the categories are in multiples of five, with a total maximum possible score for all factors of 1,000 and a minimum possible score of 125. These MEC HA scores are *qualitative references only* and should not be interpreted as quantitative measures of explosive hazard. A summary of the maximum possible scores and their related weights with regard to the overall MEC HA score are shown in Table R.1b.

**Table R.1a  
Summary of MEC HA Input Factors and Associated Baseline Scores**

<b>Input Factor</b>	<b>Input Factor Category</b>	<b>Baseline Score</b>	<b>Score After Subsurface Cleanup</b>
Energetic Material Type	HE and Low Explosive Fillers in Fragmenting Rounds	100	100
	White Phosphorus	70	70
	Pyrotechnic	60	60
	Propellant	50	50
	Spotting Charge	40	40
	Incendiary	30	30
Location of Additional Human Receptors	Inside the MRS or inside the ESQD arc surrounding the MRS	30	30
	Outside of the ESQD arc	0	0
Site Accessibility	Full Accessibility	80	80
	Moderate Accessibility	55	55
	Limited Accessibility	15	15
	Very Limited Accessibility	5	5
Potential Contact Hours	Many Hours	120	30
	Some Hours	70	20
	Few Hours	40	10
	Very Few Hours	15	5

Source: MEC HA interim guidance document (USEPA 2008)

**Table R.1a, cont'd.**  
**Summary of MEC HA Input Factors and Associated Baseline Scores**

<b>Input Factor</b>	<b>Input Factor Category</b>	<b>Baseline Score</b>	<b>Score After Subsurface Cleanup</b>
5Amount of MEC	Target Area	180	30
	Open Burning/Open Detonation (OB/OD) Area	180	30
	Function Test Range	165	25
	Burial Pit	140	10
	Maneuver Areas	115	5
	Firing Points	75	5
	Safety Buffer Areas	30	5
	Storage	25	5
	Explosive-Related Industrial Facility	10	5
Minimum MEC Depth vs. Maximum Intrusive Depth	<b>Baseline Condition:</b> MEC located on surface and in subsurface; <b>After Cleanup:</b> intrusive depth overlaps with minimum MEC depth	240	95
	<b>Baseline Condition:</b> MEC located on surface and in subsurface; <b>After Cleanup:</b> intrusive depth <i>does not</i> overlap with minimum MEC depth	240	25
	<b>Baseline Condition:</b> MEC located only in subsurface; <b>Baseline Condition or After Cleanup:</b> intrusive depth overlaps with minimum MEC depth	150	95
	<b>Baseline Condition:</b> MEC located only in subsurface; <b>Baseline Condition or After Cleanup:</b> intrusive depth <i>does not</i> overlap with minimum MEC depth	50	25
Migration Potential	Possible	30	10
	Unlikely	10	10
MEC Classification	Sensitive UXO	180	180
	UXO	110	110
	Fuzed Sensitive DMM	105	105
	Fuzed DMM	55	55
	Unfuzed DMM	45	45
	Bulk Explosives	45	45
MEC Size	Small	40	40
	Large	0	0

Source: MEC HA interim guidance document (USEPA 2008)

**Table R.1b**  
**Summary of MEC HA Maximum Scores and Weights**

<b>Explosive Hazard Component</b>	<b>Input Factor</b>	<b>Maximum Scores</b>	<b>Weights</b>
Severity	Energetic Material Type	100	10%
	Location of Additional Human Receptors	30	3%
	<i>Component Total</i>	<i>130</i>	<i>13%</i>
Accessibility	Site Accessibility	80	8%
	Total Contact Hours	120	12%
	Amount of MEC	180	18%
	Minimum MEC Depth vs. Maximum Intrusive Depth	240	24%
	Migration Potential	30	3%
	<i>Component Total</i>	<i>650</i>	<i>65%</i>
Sensitivity	MEC Classification	180	18%
	MEC Size	40	4%
	<i>Component Total</i>	<i>220</i>	<i>22%</i>
<b>Maximum Total Score</b>		<b>1,000</b>	<b>100%</b>

Source: MEC HA interim guidance document (USEPA 2008).

## **R.6 OVERVIEW OF MEC HA OUTPUT FACTORS**

Once the categories and scores for all input factors are defined for each MRS or assessment area at the site, the related scores for each category are totaled to calculate an overall MEC HA score for each MRS/assessment area. The total maximum possible MEC HA score for an MRS/assessment area ranges from 125 - 1,000. The MEC HA method identified the associated hazard levels for these scores, which range from 1 to 4. A Hazard Level of 1 indicates the highest potential explosive hazard conditions and a hazard level of 4 indicates low potential explosive hazard conditions. The basis for these hazard levels is detailed in the MEC HA interim guidance document (USEPA 2008). The total MEC HA scores and associated hazard levels are *qualitative references only* and should not be interpreted as quantitative measures of explosive hazard, or as the sole basis for determining whether or not further action is necessary at a site. A summary of the hazard levels and their related MEC HA scores is presented in Table R.2.

**Table R.2  
Hazard Level Scoring Rankings Table**

<b>Hazard Level</b>	<b>Maximum MEC HA Score</b>	<b>Minimum MEC HA Score</b>	<b>Associated Relative Explosive Hazard</b>
1	1,000	840	Highest potential explosive hazard conditions
2	835	725	High potential explosive hazard conditions
3	720	530	Moderate potential explosive hazard conditions
4	525	125	Low potential explosive hazard conditions

Source: MEC HA interim guidance document (USEPA 2008).

## **R.7 BASELINE MEC HAZARD EVALUATION**

A qualitative baseline evaluation of the potential MEC hazards posed was conducted for the 4825 Glenbrook Road property. The qualitative baseline evaluation of potential MEC hazards was conducted by reviewing each of the MEC HA input factors described above. Historical and field investigation data were used to determine the appropriate categories for each MEC HA input factor (see Subchapter R.5).

Based on the site history and previous investigations, 4825 Glenbrook Road was the location of one or more munitions and/or CWM burial pits. Numerous munitions including 75mm chemical projectiles, 75mm shrapnel projectiles, and 4.7-inch shrapnel projectiles have been removed from this site, many of which were configured with explosives, explosive bursters, and/or fuzes. The fuzed items were recovered during the 2001 and 2002 investigations. All of the MEC items found were considered to be DMM; none were classified as UXO. The contents of the burial pits identified at the site to date have been removed but, for the purposes of this MEC HA, it is assumed that one or more additional burial pits are potentially present at 4825 Glenbrook Road. These are the only potential MEC items found to date and there is no evidence that other types of MEC might be present. The explosive hazards presented by these items are associated with their fuzes and bursters. The related energetic material type, MEC classification, and MEC size for these items are presented below.

Two scenarios are considered for this baseline MEC HA. The first baseline scenario reflects the current site conditions anticipated over the next one to two years and assumes that site activities will be limited to basic, non-intrusive landscape maintenance (e.g., mowing, pruning, etc.) and possible intrusive construction activities up to a depth of 12 feet. This scenario also accounts for the fence around the property that currently limits public access. *(Note: This scenario does not include intrusive investigations or response actions – these activities are conducted under approved accident prevention and/or site safety and health plans that include hazard mitigation measures, therefore, this latter scenario is not addressed by the MEC HA method, which is designed to evaluate incidental, accidental encounters with*

*explosive hazards.*) The second baseline scenario reflects the hypothetical conditions that would exist under the “no action” alternative – i.e., if the 4825 Glenbrook Road property was returned to residential use with no further remedial action conducted. (*Note: This scenario is hypothetical only. Evaluation of a no-action alternative is required under CERCLA to provide a baseline for comparison of other remedial technologies and alternatives.*) The primary differences between the “Current Site Conditions (No Residential Use or Subsurface Clearance)” and “No Action (Residential Use, No Subsurface Clearance)” scenarios are the ‘site accessibility,’ ‘potential contact hours,’ and ‘Minimum MEC Depth Relative to the Maximum Receptor Intrusive Depth’ factors. The two baseline scenarios are addressed together in the following paragraphs with notes where the assigned MEC HA input factors differ.

*MRS Definition:* The MRS that is the subject of this MEC HA is the property at 4825 Glenbrook Road. The MRS boundary used for these analyses is defined as the 4825 Glenbrook Road property boundary. This boundary applies to both the Current Site Conditions (No Residential Use or Subsurface Clearance) and the No Action (Residential Use, No Subsurface Clearance) scenarios.

*Energetic Material Type:* The MEC items known or suspected to be present at 4825 Glenbrook Road include 75mm chemical projectiles, 75mm shrapnel projectiles, and 4.7-inch shrapnel projectiles. All of these items contain explosives and detonation of the rounds would result in fragmentation. On this basis, the energetic material type selected for the site is determined to be ‘high explosives and low explosive filler in fragmenting rounds,’ which is the most potentially hazardous of the available selections. This factor applies to both the Current Site Conditions (No Residential Use or Subsurface Clearance) and the No Action (Residential Use, No Subsurface Clearance) scenarios.

*Location of Additional Human Receptors:* The MEC items known or suspected to be present at 4825 Glenbrook Road include 75mm chemical projectiles, 75mm shrapnel projectiles, and 4.7-inch shrapnel projectiles. The hazardous fragment distances (HFD) for these three items are listed in Table R.3. For the items known or suspected to be present, the most conservative (greatest) HFD is 197 feet, which is the HFD for the 4.7-inch shrapnel projectile. On this basis, the ESQD used for this MEC HA is 197 feet. Figure A-2 demonstrates this ESQD. The presence of the house at 4825 Glenbrook Road and the proximity of the seven neighboring residential properties, one AU building (Watkins Hall), and one AU parking lot, which are located either fully or partially within the ESQD, indicates that there are several locations where people might congregate within the boundary of the site or within the ESQD arc as measured from the boundary. Based on this information, the location of additional human receptors for 4825 Glenbrook Road is assessed to be ‘inside MRS or inside the ESQD arc surrounding the MRS,’ which is the most conservative of the available selections (i.e., the input factor with the highest associated MEC HA score). This factor applies to both the Current Site Conditions (No Residential Use or Subsurface Clearance) and the No Action (Residential Use, No Subsurface Clearance) scenarios.

**Table R.3**  
**Net Explosive Weights, Hazardous Fragment Distances, and Total Weights**  
**for Munitions Found At 4825 Glenbrook road**

<b>Munition</b>	<b>Net Explosive Weight</b>	<b>Hazardous Fragment Distance</b>	<b>Total Munition Weight</b>
Projectile, 75mm, Chemical, Mk II	0.078-lbs. tetryl	118 feet	12.9-lbs.
Projectile, 75mm, Shrapnel, Mk 1	0.1875-lbs. black powder	121 feet	15.9-lbs.
Projectile, 4.7-inch, Common Shrapnel, Gun Model 1917	0.59-lbs. black powder	197 feet	45-lbs.

Source: DoD Explosives Safety Board Fragmentation Review Forms, dated 9/30/10.

*Site Accessibility:* As described above, the Current Site Conditions (No Residential Use or Subsurface Clearance) scenario considered for the 4825 Glenbrook Road property assumes that a fence is present around the property to limit public access. Based on this information, 4825 Glenbrook Road is considered to be a site with some barriers to entry and is classified as having ‘moderate accessibility’ under the Current Site Conditions (No Residential Use or Subsurface Clearance) scenario. However, under the No Action (Residential Use, No Subsurface Clearance) scenario the fence would be removed and the property would be considered to be a site with no barriers to entry. Therefore, 4825 Glenbrook Road would be classified as having ‘full accessibility’ under the No Action (Residential Use, No Subsurface Clearance) scenario.

*Potential Contact Hours – Current Site Conditions (No Residential Use or Subsurface Clearance) Scenario:* As described above, the Current Site Conditions (No Residential Use or Subsurface Clearance) scenario considered for the 4825 Glenbrook Road property reflects the current site conditions, which assumes that site activities will be limited to basic, non-intrusive landscape maintenance (e.g., mowing, pruning, etc.) and possible intrusive construction activities up to a depth of 12 feet bgs. Note that this scenario does not include potential future intrusive investigations or response actions. Under this scenario, commercial/industrial workers (e.g., yard workers, landscapers) are assumed to spend an average of 12 hours per month at the property, for a total of 144 hours per year. In addition to these non-intrusive workers, AU has indicated that some construction activities may occur at the property and these activities might be intrusive (up to depths of 12 feet). For purposes of this MEC HA, these activities are assumed to occur three times per year with each occurrence involving a group of five construction workers working two 40-hour weeks, for a total of 1,200 hours per year. Based on this information, the total potential contact hours for the 4825 Glenbrook Road property are calculated to be 1,344 receptor-hours/year, which corresponds to a classification of ‘very few hours’ (less than 10,000 receptor-hours/year).

*Potential Contact Hours – No Action (Residential Use, No Subsurface Clearance) Scenario:* As described above, the No Action (Residential Use, No Subsurface Clearance)

scenario considered for the 4825 Glenbrook Road property assumes the future residential use of the property. On this basis, the contact hour calculation assumes that six people live at the residence, each of whom is assumed to spend an average of 2 hours outside per day, for a total of 4,380 hours per year. In addition to the residents, commercial/industrial workers (e.g., yard workers, landscapers, utility workers, etc.), and construction workers are assumed to spend an average of 24 hours per month at the property, for a total of 288 hours per year. Intrusive activities are assumed to occur up to a depth of 12 feet bgs. Based on this information, the total potential contact hours for the 4825 Glenbrook Road property under the No Action (Residential Use, No Subsurface Clearance) scenario are calculated to be 4,668 receptor-hours/year, which corresponds to a classification of ‘very few hours’ (less than 10,000 receptor-hours/year).

*Amount of MEC:* The potential MEC presence at 4825 Glenbrook Road is the result of munitions burial in one or more disposal pits. As noted above, while the contents of the identified burial pits at this site have been removed, one or more additional burial pits are hypothetically assumed to remain at 4825 Glenbrook Road for the purpose of this MEC HA. For this reason, a classification of ‘burial pit’ is considered most appropriate for the site for purposes of this MEC HA. This factor applies to both the Current Site Conditions (No Residential Use or Subsurface Clearance) and the No Action (Residential Use, No Subsurface Clearance) scenarios.

*Minimum MEC Depth Relative to the Maximum Receptor Intrusive Depth:* Buried munitions have been found in pits at 4825 Glenbrook Road at depths of as little as one foot bgs. As described above, the maximum receptor intrusive depth at the site is anticipated to be 12 feet bgs. Based on this information, the minimum MEC depth relative to the maximum receptor intrusive depth for 4825 Glenbrook Road is assessed to be ‘MEC located only in subsurface – intrusive depth overlaps with minimum MEC depth’. This factor applies to both the Current Site Conditions (No Residential Use or Subsurface Clearance) and the No Action (Residential Use, No Subsurface Clearance) scenarios.

*Migration Potential:* The open areas of the property at 4825 Glenbrook Road are landscaped and covered with sod or other stabilizing vegetation. While there are some slopes at the site, surface erosion that might result in the exposure of buried MEC is unlikely. However, temperatures of freezing or below can occur each winter and the frost line extends down to approximately 3 feet, which is greater than the minimum MEC depth at the site (see above). Therefore, it is possible that frost heave might result in the exposure of buried MEC items and so the migration potential is evaluated as ‘possible’ at this site. This factor applies to both the Current Site Conditions (No Residential Use or Subsurface Clearance) and the No Action (Residential Use, No Subsurface Clearance) scenarios.

*MEC Classification:* As described previously, the MEC items known or suspected to be present at 4825 Glenbrook Road include 75mm chemical projectiles, 75mm shrapnel projectiles, and 4.7-inch shrapnel projectiles. Multiple explosively configured items have been recovered from the MRS during previous investigations. Some of these items have been fuzed, but not primed, fired, or armed; and consequently, all are considered to be DMM and not UXO. None of the items found previously are considered to be ‘sensitive’ munitions according to the criteria listed in the MEC HA interim guidance document (USEPA 2008). Based on these

factors, the MEC classification for this site is assessed as ‘fuzed DMM’. This factor applies to both the Current Site Conditions (No Residential Use or Subsurface Clearance) and the No Action (Residential Use, No Subsurface Clearance) scenarios.

*MEC Size:* The MEC items known or suspected to be present at 4825 Glenbrook Road include 75mm chemical projectiles, 75mm shrapnel projectiles, and 4.7-inch shrapnel projectiles. Based on the criteria defined in the MEC HA method, the MEC size for the site is classified as having the highest potential to be moved or ‘small’ for purposes of this MEC HA because all of the munitions known or suspected to be present weigh less than 90-lbs (see Table R.3). This factor applies to both the Current Site Conditions (No Residential Use or Subsurface Clearance) and the No Action (No Subsurface Clearance, Residential Use) scenarios.

*MEC HA Results:* The MRS at 4825 Glenbrook Road has a total MEC HA score of 615 under the Current Site Conditions (No Residential Use or Subsurface Clearance) scenario, which equates to a Hazard Level of 3 (Table R.4a). Under the No Action (Residential Use, No Subsurface Clearance) scenario, the MRS at 4825 Glenbrook Road has a total MEC HA score of 640, which also equates to a Hazard Level of 3 (Table R.4b). These hazard levels both indicate an MRS with “moderate potential explosive hazard conditions” (USEPA 2008). This information will provide the baseline for any future assessment of response alternatives. Note that these total MEC HA scores and the associated hazard levels are *qualitative references only* and should not be interpreted as quantitative measures of explosive hazard. Also, this MEC HA does not address or otherwise evaluate potential risks related to chemical agent posed by CWM that might be present at the site.

## **R.8 EVALUATION OF POTENTIAL REMEDIAL ACTIONS**

In addition to providing a technique to evaluate baseline MEC hazards, the MEC HA method also establishes a process to evaluate qualitatively the hazard mitigation that would be achieved by remedial actions. This process is based on assumptions made regarding the effects of a given remedial response (e.g., LUCs, surface cleanup, subsurface cleanup), coupled with modified scores for MEC HA input factors, to evaluate how the MEC HA score might be reduced following implementation of the response. The primary purpose of this process is to support the evaluation of response alternatives conducted during an FS; i.e., this evaluation should not be used as the sole basis upon which to recommend a remedial response. As with the baseline score, these total MEC HA scores and the associated hazard levels are *qualitative references only* and should not be interpreted as quantitative measures of explosive hazard, nor do they indicate or otherwise evaluate how potential hazards and/or risks posed by CWM might be affected by a remedial action.

Three potential remedial alternative scenarios are evaluated in this document: (1) Subsurface Clearance with Future Residential Use, (2) Subsurface Clearance, LUCs, Future Recreational Use, and (3) No Subsurface Clearance, LUCs, Future Recreational Use. A brief description of each of these potential remedial alternative scenarios is provided in the following subchapters, together with the associated modifications to the MEC HA score.

**Table R.4a**  
**Summary of MEC HA Baseline Score**  
**Current Site Conditions (No Residential Use or Subsurface Clearance) Scenario**  
**4825 Glenbrook Road, Washington, D.C.**

<b>Explosive Hazard Component</b>	<b>Input Factors</b>	<b>Category Selected for MRS/Area</b>	<b>Score <sup>(1), (2)</sup> (Max. Score)</b>
Severity	Energetic Material Type	High explosives and low explosive filler in fragmenting rounds	100 (100)
	Location of Additional Human Receptors	Inside MRS or inside ESQD arc around MRS	30 (30)
Accessibility	Site Accessibility	Moderate accessibility	55 (80)
	Total Contact Hours	Very few hours	15 (120)
	Amount of MEC	Burial Pit	140 (180)
	Minimum MEC Depth vs. Maximum Intrusive Depth	MEC located only in subsurface; max. intrusive depth overlaps min. MEC depth	150 (240)
	Migration Potential	Possible	30 (30)
Sensitivity	MEC Classification	Fuzed DMM	55 (180)
	MEC Size	Small	40 (40)
Total MEC HA Score <sup>(2)</sup>			<b>615</b> <b>(1,000)</b>
MEC HA Hazard Level			<b>3</b>

(1) Scores assigned for each factor as listed and described in MEC HA interim guidance document (USEPA 2008). The maximum possible MEC HA score is listed in parentheses beneath the assigned score(s) for reference purposes.

(2) The scores for the input factors are based on the baseline condition.

**Table R.4b**  
**Summary of MEC HA Baseline Score**  
**No Action (Residential Use, No Subsurface Clearance) Scenario**  
**4825 Glenbrook Road, Washington, D.C.**

<b>Explosive Hazard Component</b>	<b>Input Factors</b>	<b>Category Selected for MRS/Area</b>	<b>Score <sup>(1), (2)</sup> (Max. Score)</b>
Severity	Energetic Material Type	High explosives and low explosive filler in fragmenting rounds	100 (100)
	Location of Additional Human Receptors	Inside MRS or inside ESQD arc around MRS	30 (30)
Accessibility	Site Accessibility	Full accessibility	80 (80)
	Total Contact Hours	Very few hours	15 (120)
	Amount of MEC	Burial Pit	140 (180)
	Minimum MEC Depth vs. Maximum Intrusive Depth	MEC located only in subsurface; max. intrusive depth overlaps min. MEC depth	150 (240)
	Migration Potential	Possible	30 (30)
Sensitivity	MEC Classification	Fuzed DMM	55 (180)
	MEC Size	Small	40 (40)
Total MEC HA Score <sup>(2)</sup>			<b>640</b> <b>(1,000)</b>
MEC HA Hazard Level			<b>3</b>

(1) Scores assigned for each factor as listed and described in MEC HA interim guidance document (USEPA 2008). The maximum possible MEC HA score is listed in parentheses beneath the assigned score(s) for reference purposes.

(2) The scores for the input factors are based on the baseline condition.

### R.8.1 Subsurface Clearance with Future Residential Use

The first remedial alternative considered in this MEC HA reflects a scenario wherein the property is remediated and can revert to residential use. The remediation conducted would be a subsurface MEC clearance to a minimum depth of 12 feet throughout the MRS, which is assumed to be sufficient to address any remaining burial pits or trenches that could be present at the 4825 Glenbrook Road property. Under this scenario, activities at the property would be limited to typical residential activities, landscape maintenance (e.g., outdoor recreation, yard work, etc.), and possible intrusive activities (including utility maintenance and construction). Under these conditions, intrusive activities are assumed to be no deeper than 12 feet bgs. Also under this scenario, the fence around the property that currently limits public access is assumed to have been removed.

Using the above assumptions, this scenario modifies the input assumptions for the MRS with regard to the *site accessibility*, *potential contact hours*, *amount of MEC*, *minimum MEC depth vs. maximum intrusive depth*, and *migration potential* categories. All other input assumptions and related MEC HA scores are unchanged. The scores assigned for these categories under the baseline condition are reduced in accordance with USEPA 2008 to reflect that subsurface MEC was removed; therefore, ‘after cleanup: activities do not overlap with MEC location’. Consequently, human receptors are no longer as likely to come into contact with MEC at the 4825 Glenbrook Road property. The modified assumptions and their affect on the associated MEC HA input factors are described below.

*MRS Definition*: Unchanged from baseline evaluation.

*Energetic Material Type*: Unchanged from baseline evaluation.

*Location of Additional Human Receptors*: Unchanged from baseline evaluation.

*Site Accessibility*: As described above, the future land use scenario considered for the 4825 Glenbrook Road property reflects the conditions once a remedial response has been completed and the fence currently present around the property has been removed. Therefore, while the land would be privately owned, there would be no major restrictions to site access. Based on this information, 4825 Glenbrook Road would be considered a site with no barriers to entry and would be classified as having ‘full accessibility’. This change in site accessibility has the result of increasing the score for this input factor from the Current Site Conditions (No Residential Use or Subsurface Clearance) baseline scenario from 55 to 80 under the Subsurface Clearance with Future Residential Use scenario; however, there would be no change in the score if compared to the No Action (Residential Use, No Subsurface Clearance) baseline scenario.

*Potential Contact Hours*: As described above, the future land use scenario considered for the 4825 Glenbrook Road property once a remedial response has been implemented assumes the future residential use of the property. On this basis, the contact hour calculation is identical to that for the No Action (Residential Use, No Subsurface Clearance) scenario described earlier and assumes that six people live at the residence, each of whom is assumed to spend an average

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of 2 hours outside per day, for a total of 4,380 hours per year. In addition to the residents, commercial/industrial workers (e.g., yard workers, landscapers, utility workers, etc.), and construction workers are assumed to spend an average of 24 hours per month at the property, for a total of 288 hours per year. Intrusive activities are assumed to occur up to a depth of 12 feet bgs. Based on this information, the total potential contact hours for the 4825 Glenbrook Road property under the future scenario are calculated to be 4,668 receptor-hours/year. This value corresponds to a classification of ‘very few hours’ (less than 10,000 receptor-hours/year). Even though the potential contact hours classification does not change, the MEC HA score is reduced from 15 to 5 for this input factor under the Subsurface Clearance with Future Residential Use scenario because of the assumed subsurface MEC clearance (USEPA 2008).

*Amount of MEC:* The potential MEC presence at 4825 Glenbrook Road is the result of munitions burial in one or more disposal pits; therefore, the classification of ‘burial pit’ is selected. However, the MEC HA associated score for this input factor is reduced from 140 to 10 under the Subsurface Clearance with Future Residential Use scenario because of the assumed subsurface MEC clearance (USEPA 2008).

*Minimum MEC Depth Relative to the Maximum Receptor Intrusive Depth:* The maximum receptor intrusive depth at the site is anticipated to be 12 feet bgs. As a result of a MEC clearance to a minimum depth of 12 feet bgs throughout the MRS, the maximum intrusive depth would no longer overlap with the minimum MEC depth. Based on this scenario, the minimum MEC depth relative to the maximum receptor intrusive depth for 4825 Glenbrook Road would be classified as ‘MEC located only in subsurface – intrusive depth *does not* overlap with minimum MEC depth’. This approach has the result of reducing the score for this input factor from 150 to 25 based on the application of the Subsurface Clearance with Future Residential Use scenario because of the assumed subsurface MEC clearance.

*Migration Potential:* The selection for this factor (i.e., “possible”) is unchanged from the baseline evaluation. However, the MEC HA associated score for this input factor is reduced from 30 to 10 under the Subsurface Clearance with Future Residential Use scenario because of the assumed subsurface MEC clearance (USEPA 2008).

*MEC Classification:* Unchanged from baseline evaluation.

*MEC Size:* Unchanged from baseline evaluation.

*MEC HA Results:* Accounting for these modifications, under the Subsurface Clearance with Future Residential Use scenario the total MEC HA score for the 4825 Glenbrook Road property would be reduced to 355, which also reduces the corresponding Hazard Level from 3 (“moderate potential explosive hazard conditions”) to 4 (“low potential explosive hazard conditions”). The revised MEC HA scores for the 4825 Glenbrook Road property under the Subsurface Clearance with Future Residential Use scenario are shown in Table R.5.

**Table R.5**  
**Summary of MEC HA Score**  
**Subsurface Clearance with Future Residential Use Scenario**  
**4825 Glenbrook Road, Washington, D.C.**

<b>Explosive Hazard Component</b>	<b>Input Factors</b>	<b>Category Selected for MRS/Area</b>	<b>Score <sup>(1)(2)</sup> (Max. Score)</b>
Severity	Energetic Material Type	High explosives and low explosive filler in fragmenting rounds	100 (100)
	Location of Additional Human Receptors	Inside MRS or inside ESQD arc around MRS	30 (30)
Accessibility	Site Accessibility	<i>Full accessibility</i>	<b>80</b> (80)
	Total Contact Hours	Very few hours	<b>5</b> (120)
	Amount of MEC	Burial Pit	<b>10</b> (180)
	Minimum MEC Depth vs. Maximum Intrusive Depth	<i>MEC located only in subsurface; max. intrusive depth <u>does not</u> overlap with min. MEC depth</i>	<b>25</b> (240)
	Migration Potential	Possible	<b>10</b> (30)
Sensitivity	MEC Classification	Fuzed DMM	55 (180)
	MEC Size	Small	40 (40)
Total MEC HA Score			<b>355</b> (1,000)
MEC HA Hazard Level			<b>4</b>

(1) Scores assigned for each factor under a “subsurface cleanup” scenario as listed and described in USEPA 2008. The maximum possible MEC HA score is listed in parentheses beneath the assigned score(s) for reference purposes.

(2) Categories and/or scores that change from the baseline as a result of the assumed future scenario are shown in *bold italics*. Subsurface clearance assumed to be to a depth of at least 12 feet.

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### R.8.2 Subsurface Clearance, LUCs, Future Recreational Use

The second remedial alternative considered in this MEC HA reflects a scenario wherein the property is remediated to a fixed depth, and then the building is demolished and the property is landscaped for recreational use as a small neighborhood park. The remediation conducted would be a subsurface MEC clearance to a minimum depth of 3 feet throughout the MRS, which is assumed to be sufficient to address any remaining MEC that could be present down to that depth at the 4825 Glenbrook Road property. In addition, after the remedial action, LUCs would be implemented to limit all intrusive activities at the remediated property to no deeper than 2 feet. Under this scenario, activities at the property would be limited to typical recreational activities and landscape maintenance (e.g., outdoor recreation, yard work, etc.). Also under this scenario, the fence around the property that currently limits public access is assumed to have been removed. *(Note: This scenario assumes that the demolition of the building and any subsequent landscaping to establish the park has been completed, so any hazards resulting from intrusive activities involved with these operations are not considered under this MEC HA.)*

Using the above assumptions, this scenario modifies the input assumptions for the MRS with regard to the *site accessibility, potential contact hours, amount of MEC, minimum MEC depth vs. maximum intrusive depth, and migration potential* categories. All other input assumptions and related MEC HA scores are unchanged. The scores assigned for these categories under the baseline condition are reduced in accordance with USEPA 2008 to reflect that subsurface MEC was removed; therefore, ‘after cleanup: activities do not overlap with MEC location’. Consequently, human receptors are no longer as likely to come into contact with MEC at the 4825 Glenbrook Road property. The modified assumptions and their affect on the associated MEC HA input factors are described below.

*MRS Definition:* Unchanged from baseline evaluation.

*Energetic Material Type:* Unchanged from baseline evaluation.

*Location of Additional Human Receptors:* Unchanged from baseline evaluation.

*Site Accessibility:* As described above, the future land use scenario considered for the 4825 Glenbrook Road property reflects the conditions once a remedial response has been completed, the fence currently present around the property has been removed, and the land has been opened to public access. Therefore, there would be no major restrictions to site access. Based on this information, 4825 Glenbrook Road would be considered a site with no barriers to entry and would be classified as having ‘full accessibility’. This change in site accessibility has the result of increasing the score for this input factor from the Current Site Conditions (No Residential Use or Subsurface Clearance) baseline scenario from 55 to 80 under the Subsurface Clearance, LUCs, Future Recreational Use scenario; however, there would be no change in the score if compared to the No Action (Residential Use, No Subsurface Clearance) baseline scenario.

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*Potential Contact Hours:* As described above, the future land use scenario considered for the 4825 Glenbrook Road property once a remedial response has been implemented assumes the future recreational use of the property. On this basis, the contact hour calculation assumes that 100 local residents use the park for up to 3 hours per day, 52 days each year. This gives a total of 15,600 hours per year. In addition to the recreational users, commercial/industrial workers (e.g., landscapers), are assumed to spend an average of 24 hours per month at the property, for a total of 288 hours per year. Intrusive activities are assumed to occur up to a depth of 2 feet bgs, as stipulated by the LUCs. Based on this information, the total potential contact hours for the 4825 Glenbrook Road property under the future scenario are calculated to be 15,888 receptor-hours/year. This value corresponds to a classification of ‘few hours’ (between 10,000 and 99,999 receptor-hours/year), which is an increase from the baseline scenarios. However, even though the potential contact hours classification increases, the MEC HA score is reduced from 15 to 10 for this input factor under the Subsurface Clearance, LUCs, Future Recreational Use scenario because of the assumed subsurface MEC clearance (USEPA 2008).

*Amount of MEC:* The potential MEC presence at 4825 Glenbrook Road is the result of munitions burial in one or more disposal pits; therefore, the classification of ‘burial pit’ is selected. However, the MEC HA associated score for this input factor is reduced from 140 to 10 under the Subsurface Clearance, LUCs, Future Recreational Use scenario because of the assumed subsurface MEC clearance (USEPA 2008).

*Minimum MEC Depth Relative to the Maximum Receptor Intrusive Depth:* The maximum receptor intrusive depth at the site is anticipated to be 2 feet bgs, as stipulated by the LUCs. As a result of a MEC clearance to a minimum depth of 3 feet bgs throughout the MRS, the maximum intrusive depth would no longer overlap with the minimum MEC depth. Based on this scenario, the minimum MEC depth relative to the maximum receptor intrusive depth for 4825 Glenbrook Road would be classified as ‘MEC located only in subsurface – intrusive depth does not overlap with minimum MEC depth’. This approach has the result of reducing the score for this input factor from 150 to 25 under the Subsurface Clearance, LUCs, Future Recreational Use scenario.

*Migration Potential:* The selection for this factor (i.e., ‘possible’) is unchanged from the baseline evaluation. However, the MEC HA associated score for this input factor is reduced from 30 to 10 under the Subsurface Clearance, LUCs, Future Recreational Use scenario because of the assumed subsurface MEC clearance (USEPA 2008).

*MEC Classification:* Unchanged from baseline evaluation.

*MEC Size:* Unchanged from baseline evaluation.

*MEC HA Results:* Accounting for these modifications, under the Subsurface Clearance, LUCs, Future Recreational Use scenario the total MEC HA score for the 4825 Glenbrook Road property would be reduced to 360, which also reduces the corresponding Hazard Level from 3 (“moderate potential explosive hazard conditions”) to 4 (“low potential explosive hazard

conditions”). The revised MEC HA scores for the 4825 Glenbrook Road property under the Subsurface Clearance, LUCs, Future Recreational Use scenario are shown in Table R.6.

**Table R.6**  
**Summary of MEC HA Score**  
**Subsurface Clearance, LUCs, Future Recreational Use Scenario**  
**4825 Glenbrook Road, Washington, D.C.**

<b>Explosive Hazard Component</b>	<b>Input Factors</b>	<b>Category Selected for MRS/Area</b>	<b>Score <sup>(1)(2)</sup> (Max. Score)</b>
Severity	Energetic Material Type	High explosives and low explosive filler in fragmenting rounds	100 (100)
	Location of Additional Human Receptors	Inside MRS or inside ESQD arc around MRS	30 (30)
Accessibility	Site Accessibility	<i>Full accessibility</i>	<b>80</b> (80)
	Total Contact Hours	<i>Few hours</i>	<b>10</b> (120)
	Amount of MEC	Burial Pit	<b>10</b> (180)
	Minimum MEC Depth vs. Maximum Intrusive Depth	<i>MEC located only in subsurface; max. intrusive depth <u>does not</u> overlap with min. MEC depth</i>	<b>25</b> (240)
	Migration Potential	Possible	<b>10</b> (30)
Sensitivity	MEC Classification	Fuzed DMM	55 (180)
	MEC Size	Small	40 (40)
Total MEC HA Score			<b>360</b> (1,000)
MEC HA Hazard Level			<b>4</b>

(1) Scores assigned for each factor under a “subsurface cleanup” scenario as listed and described in USEPA 2008. The maximum possible MEC HA score is listed in parentheses beneath the assigned score(s) for reference purposes.

(2) Categories and/or scores that change from the baseline as a result of the assumed future scenario are shown in *bold italics*. Subsurface clearance assumed to be to a depth of at least 3 feet.

### **R.8.3 No Subsurface Clearance, Land Use Controls, Future Recreational Use**

The third remedial alternative considered in this MEC HA reflects a scenario wherein the building is demolished and the property is landscaped for recreational use as a small neighborhood park. Under this scenario, no further MEC clearance would be conducted, but LUCs would be implemented to limit all intrusive activities at the remediated property to no deeper than 1 foot. Under this scenario, activities at the property would be limited to typical recreational activities and landscape maintenance (e.g., outdoor recreation, yard work, etc.). Also under this scenario, the fence around the property that currently limits public access is assumed to have been removed. *(Note: This scenario assumes that the demolition of the building and any subsequent landscaping to establish the park has been completed, so any hazards resulting from intrusive activities involved with these operations are not considered under this MEC HA.)*

Using the above assumptions, this scenario modifies the input assumptions for the MRS with regard to the *site accessibility*, *potential contact hours*, and *minimum MEC depth vs. maximum intrusive depth* categories. All other input assumptions and related MEC HA scores are unchanged. The modified assumptions and their affect on the associated MEC HA input factors are described below.

*MRS Definition:* Unchanged from baseline evaluation.

*Energetic Material Type:* Unchanged from baseline evaluation.

*Location of Additional Human Receptors:* Unchanged from baseline evaluation.

*Site Accessibility:* As described above, the future land use scenario considered for the 4825 Glenbrook Road property reflects the conditions once a remedial response has been completed, the fence currently present around the property has been removed, and the land has been opened to public access. Therefore, there would be no major restrictions to site access. Based on this information, 4825 Glenbrook Road would be considered a site with no barriers to entry and would be classified as having ‘full accessibility’. This change in site accessibility has the result of increasing the score for this input factor from the Current Site Conditions (No Residential Use or Subsurface Clearance) baseline scenario from 55 to 80 under the No Subsurface Clearance, LUCs, Future Recreational Use scenario; however, there would be no change in the score if compared to the No Action (Residential Use, No Subsurface Clearance) baseline scenario.

*Potential Contact Hours:* As described above, the future land use scenario considered for the 4825 Glenbrook Road property once a remedial response has been implemented assumes the future recreational use of the property. On this basis, the contact hour calculation assumes that 100 local residents use the park for up to 3 hours per day, 52 days each year. This gives a total of 15,600 hours per year. In addition to the recreational users, commercial/industrial workers (e.g., landscapers), are assumed to spend an average of 24 hours per month at the property, for a total of 288 hours per year. Intrusive activities are assumed to occur up to a

depth of 1 foot bgs, as stipulated by the LUCs. Based on this information, the total potential contact hours for the 4825 Glenbrook Road property under the future scenario are calculated to be 15,888 receptor-hours/year. This value corresponds to a classification of ‘few hours’ (between 10,000 and 99,999 receptor-hours/year), which is an increase from the baseline scenarios. This results in the MEC HA score increasing from 15 to 40 for this input factor under the No Subsurface Clearance, LUCs, Future Recreational Use scenario (USEPA 2008).

*Amount of MEC:* Unchanged from baseline evaluation.

*Minimum MEC Depth Relative to the Maximum Receptor Intrusive Depth:* The maximum receptor intrusive depth at the site is anticipated to be 1 feet bgs as stipulated by the LUCs and, consequently, the maximum intrusive depth would no longer overlap with the minimum MEC depth. Based on this scenario, the minimum MEC depth relative to the maximum receptor intrusive depth for 4825 Glenbrook Road would be classified as ‘MEC located only in subsurface – intrusive depth *does not* overlap with minimum MEC depth’. Consequently, human receptors are no longer as likely to come into contact with MEC at the 4825 Glenbrook Road property. While not as effective as the scenarios involving subsurface clearance, this still has the result of reducing the score for this input factor from 150 to 50 under the No Subsurface Clearance, LUCs, Future Recreational Use scenario.

*Migration Potential:* Unchanged from baseline evaluation.

*MEC Classification:* Unchanged from baseline evaluation.

*MEC Size:* Unchanged from baseline evaluation.

*MEC HA Results:* Accounting for these modifications, under the No Subsurface Clearance, LUCs, Future Recreational Use scenario the total MEC HA score for the 4825 Glenbrook Road property would be reduced to 565; however, the resulting Hazard Level of 3 (“moderate potential explosive hazard conditions”) would be unchanged from the baseline scenarios. The revised MEC HA scores for the 4825 Glenbrook Road property under the No Subsurface Clearance, LUCs, Future Recreational Use scenario are shown in Table R.7.

## **R.9 DISCUSSION OF RESULTS**

A summary of the results of all of the MEC HAs conducted for both the baseline and possible future remedial alternatives at the 4825 Glenbrook Road property are presented in Table R.8. As would be expected, the two remedial scenarios involving subsurface MEC clearance result in the greatest reduction from the baseline MEC HA score and Hazard Level. The No Subsurface Clearance, LUCs, Future Recreational Use scenario does reduce the MEC HA score, but not sufficiently to reduce the Hazard Level for the site. Based on this result, the Subsurface Clearance with Future Residential Use and Subsurface Clearance, LUCs, Future Recreational Use scenarios would be the most effective with regard to reducing potential MEC hazards at the 4825 Glenbrook Road property.

Note that these total MEC HA scores and the associated hazard levels are *qualitative references only* and should not be interpreted as quantitative measures of explosive hazard, nor

should the results of this evaluation be used as the sole basis on which to recommend a remedial response. Also, this MEC HA does not address or otherwise evaluate potential risks related to chemical agent posed by CWM that might be present at the site.

**Table R.7**  
**Summary of MEC HA Score**  
**No Subsurface Clearance, LUCs, Future Recreational Use**  
**4825 Glenbrook Road, Washington, D.C.**

<b>Explosive Hazard Component</b>	<b>Input Factors</b>	<b>Category Selected for MRS/Area</b>	<b>Score <sup>(1)(2)</sup> (Max. Score)</b>
Severity	Energetic Material Type	High explosives and low explosive filler in fragmenting rounds	100 (100)
	Location of Additional Human Receptors	Inside MRS or inside ESQD arc around MRS	30 (30)
Accessibility	Site Accessibility	<i>Full accessibility</i>	<b>80</b> (80)
	Total Contact Hours	<i>Few hours</i>	<b>40</b> (120)
	Amount of MEC	Burial Pit	140 (180)
	Minimum MEC Depth vs. Maximum Intrusive Depth	<i>MEC located only in subsurface; max. intrusive depth <u>does not</u> overlap with min. MEC depth</i>	<b>50</b> (240)
	Migration Potential	Possible	30 (30)
Sensitivity	MEC Classification	Fuzed DMM	55 (180)
	MEC Size	Small	40 (40)
Total MEC HA Score			<b>565</b> (1,000)
MEC HA Hazard Level			<b>3</b>

(1) Scores assigned for each factor under a “subsurface cleanup” scenario as listed and described in USEPA 2008. The maximum possible MEC HA score is listed in parentheses beneath the assigned score(s) for reference purposes.

(2) Categories and/or scores that change from the baseline as a result of the assumed future scenario are shown in *bold italics*. No subsurface clearance is assumed under this scenario.

**Table R.8**  
**Summary of MEC HA Results for All Evaluated Scenarios**  
**4825 Glenbrook Road, Washington, D.C.** <sup>(1)</sup>

Scenario Description	Energetic Material Type	Location of Additional Human Receptors	Site Accessibility	Total Contact Hours	Amount of MEC	Minimum MEC Depth vs. Maximum Intrusive Depth	Migration Potential	MEC Classification	MEC Size	Total MEC HA Score <sup>(125-1,000)</sup>	MEC HA Hazard Level <sup>(1-4)</sup>
<i>Maximum MEC HA Score</i>	100	30	80	120	180	240	30	180	40	<b>1,000</b>	<b>1</b>
<b>BASELINE SCENARIO:</b> Current Site Conditions (No Residential Use or Subsurface Clearance)	100 <i>HE or fragmenting rounds</i>	30 <i>Inside MRS or inside ESQD arc around MRS</i>	55 <i>Moderate accessibility</i>	15 <i>Very few hours</i>	140 <i>Burial Pit</i>	150 <i>MEC located in subsurface only; max. intrusive depth overlaps min. MEC depth</i>	30 <i>Possible</i>	55 <i>Fuzed DMM</i>	40 <i>Small</i>	<b>615</b>	<b>3</b> <i>Moderate potential (530-720)</i>
<b>BASELINE SCENARIO:</b> No Action (No Subsurface Clearance, Residential Use)	100 <i>HE or fragmenting rounds</i>	30 <i>Inside MRS or inside ESQD arc around MRS</i>	80 <i>Full accessibility</i>	15 <i>Very few hours</i>	140 <i>Burial Pit</i>	150 <i>MEC located in subsurface only; max. intrusive depth overlaps min. MEC depth</i>	30 <i>Possible</i>	55 <i>Fuzed DMM</i>	40 <i>Small</i>	<b>640</b>	<b>3</b> <i>Moderate potential (530-720)</i>
<b>REMEDIAL ACTION:</b> Subsurface Clearance with Future Residential Use <sup>(1)(2)</sup>	100 <i>HE or fragmenting rounds</i>	30 <i>Inside MRS or inside ESQD arc around MRS</i>	80 <i>Full accessibility</i>	5 <i>Very few hours</i>	10 <i>Burial Pit</i>	25 <i>MEC located in subsurface only; max. intrusive depth does <u>not</u> overlap min. MEC depth</i>	10 <i>Possible</i>	55 <i>Fuzed DMM</i>	40 <i>Small</i>	<b>355</b>	<b>4</b> <i>Low potential (125-525)</i>
<b>REMEDIAL ACTION:</b> Subsurface Clearance, LUCs, Future Recreational Use <sup>(1)(2)</sup>	100 <i>HE or fragmenting rounds</i>	30 <i>Inside MRS or inside ESQD arc around MRS</i>	80 <i>Full accessibility</i>	10 <i>Few hours</i>	10 <i>Burial Pit</i>	25 <i>MEC located in subsurface only; max. intrusive depth <u>does</u> not overlap min. MEC depth</i>	10 <i>Possible</i>	55 <i>Fuzed DMM</i>	40 <i>Small</i>	<b>360</b>	<b>4</b> <i>Low potential (125-525)</i>
<b>REMEDIAL ACTION:</b> No Subsurface Clearance, LUCs, Future Recreational Use <sup>(2)</sup>	100 <i>HE or fragmenting rounds</i>	30 <i>Inside MRS or inside ESQD arc around MRS</i>	80 <i>Full accessibility</i>	40 <i>Few hours</i>	140 <i>Burial Pit</i>	50 <i>MEC located in subsurface only; max. intrusive depth <u>does</u> not overlap min. MEC depth</i>	30 <i>Possible</i>	55 <i>Fuzed DMM</i>	40 <i>Small</i>	<b>565</b>	<b>3</b> <i>Moderate potential (530-720)</i>

(1) For these remedial actions, scores are assigned for each factor assuming a "subsurface cleanup" scenario as listed and described in the MEC HA interim guidance document (USEPA 2008).

(2) Categories and/or scores that change from the baseline as a result of the assumed future scenario are shown in **bold italics**.

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## 1 R.10 GLOSSARY OF TERMS

2 ***Discarded Military Munitions (DMM)***: Military munitions that have been abandoned without  
3 proper disposal or removed from storage in a military magazine or other storage area for  
4 the purpose of disposal. The term does not include unexploded ordnance, military  
5 munitions that are being held for future use or planned disposal, or military munitions that  
6 have been properly disposed of consistent with applicable environmental laws and  
7 regulations. (10 U.S.C. 2710(e)(2))

8 ***Munitions and Explosives of Concern (MEC)***: This term, which distinguishes specific  
9 categories of military munitions that may pose unique explosives safety risks, means:  
10 (a) Unexploded Ordnance (UXO), as defined in 10 U.S.C. 2710 (e) (9); (b) Discarded  
11 Military Munitions (DMM), as defined in 10 U.S.C. 2710(e)(2), or (c) Munitions  
12 constituents (e.g., TNT, RDX) present in high enough concentrations to pose an explosive  
13 hazard.

14 ***Unexploded Ordnance (UXO)***: Military munitions that: (a) Have been primed, fuzed, armed,  
15 or otherwise prepared for action; (b) Have been fired, dropped, launched, projected or  
16 placed in such a manner as to constitute a hazard to operations, installations, personnel, or  
17 material; and (c) Remain unexploded either by malfunction, design, or any other cause.  
18 (U.S.C. 2710(e)(9))

## 20 R.11 REFERENCES

21 DoD 2009. Memorandum for the Assistant Secretary of the Army (Installations and  
22 Environment); Assistant Secretary of the Navy (Installations and Environment); and  
23 Assistant Secretary of the Air Force (Installations, Environment, and Logistics). Subject:  
24 Trial Use of the Interim Munitions and Explosives of Concern Hazard Assessment  
25 (MEC HA) Methodology. Signed by Wayne Army, Deputy Under Secretary of Defense  
26 (Installations and Environment). Office of the Under Secretary of Defense, 3000 Defense  
27 Pentagon, Washington, D.C. January 29, 2009.

28 USACE 2007. Final Site-Specific Work Plan for the Test Pit Investigations at 4825 and 4835  
29 Glenbrook Road Properties. Prepared by Parsons. 10 August 2007.

30 USACE 2010. MEC/CWM Probability Assessment, Intrusive Investigation at 4825 Glenbrook  
31 Road, Spring Valley Formerly Used Defense Site, Washington, D.C. 1 August 2010.

32 USEPA 2008. Munitions and Explosives of Concern Hazard Assessment Methodology.  
33 Interim. [http://www.epa.gov/fedfac/documents/mec\\_methodology\\_document.htm](http://www.epa.gov/fedfac/documents/mec_methodology_document.htm).  
34 EPA 505B08001. October 2008.

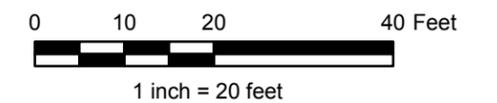
Figure A-1  
Excavated Areas at  
4825 Glenbrook Road

Spring Valley  
Washington, D.C.

**Legend**

-  Property Boundaries
-  Buildings
-  Location of MEC Items
-  High Probability Test Pits
-  Test Pits Pending Investigation
-  Test Pits Investigated with No Significant Finds
-  Test Pit 23
- Arsenic Soil**
-  Arsenic Grid to be Excavated
-  Arsenic Grid Previously Removed [2] (2000-01)
-  Arsenic Grid Previously Removed [3] (2009)
-  Arsenic Grid Previously Removed [4] (2000-01)
-  Arsenic Grid Previously Removed [5] (2009)
-  Arsenic Grid Previously Removed [6] (2009)
- Soil Excavation**
-  Excavation Depth [3.5'] (2009)
-  Excavation Depth [4'] (2010)
-  Excavation Depth [5'] (2010)
-  Excavation Depth [6'] (2010)
-  Excavation Depth [6.5'] (2009)
- Test Pit 23**
-  Excavation Depth [13'] (2002)
- Soil Overexcavation**
-  Overexcavation Depth [1.5'] (2009)
-  Overexcavation Depth [4.5'-6.5'] (2009)
-  Overexcavation Depth [10.5'] (2009)
-  Overexcavation Depth [12'] (2009)
-  20' Grid
-  Pit 2 (POI-24R)

Note: The grid systems at 4825 & 4835 Glenbrook Road are slightly offset from each other (east to west) as shown.



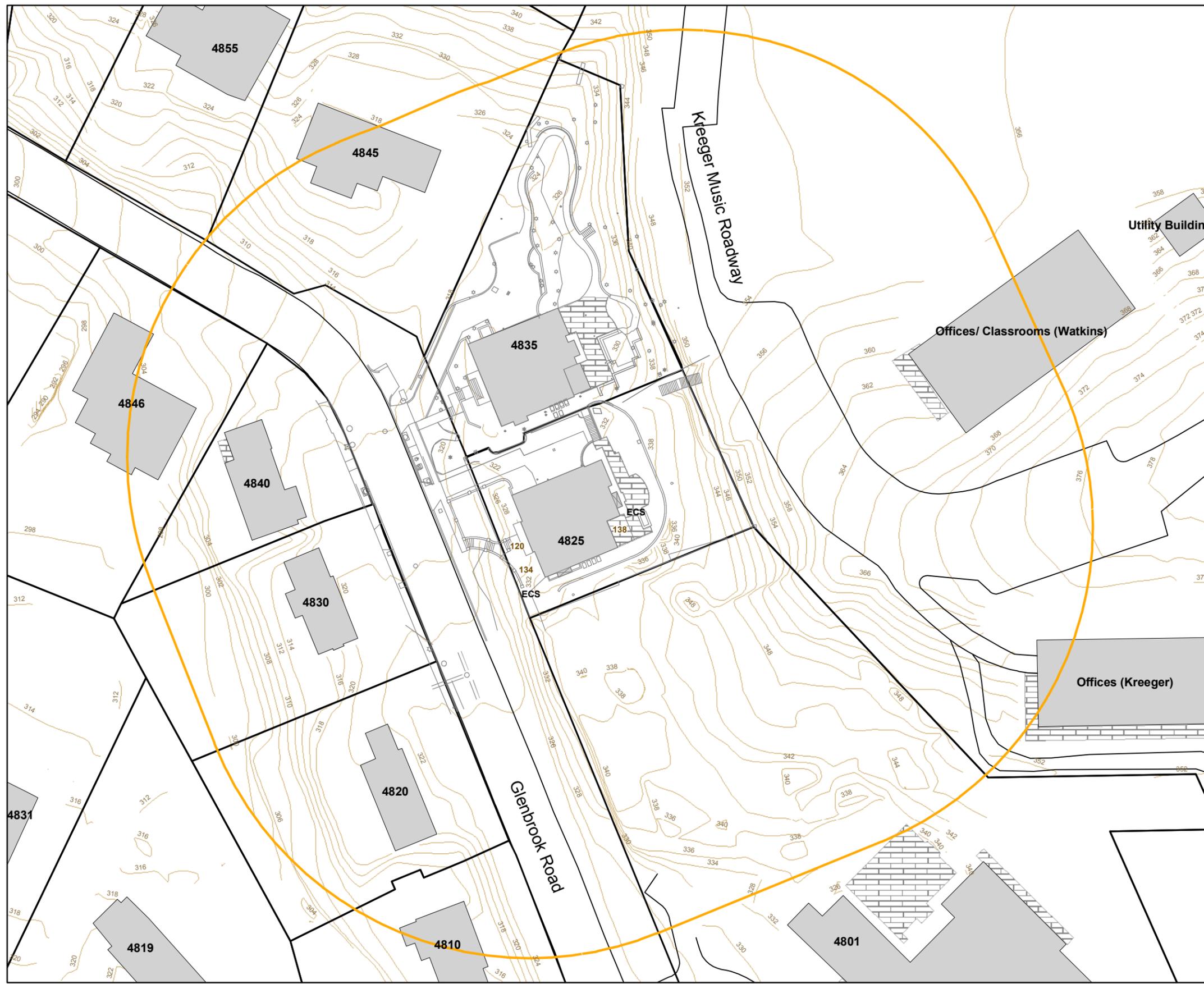
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**PARSONS**



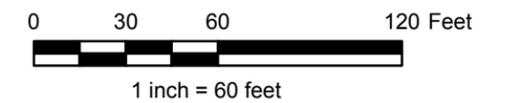
Figure A-2  
 ESQD Hazard Distance  
 4825 Glenbrook Road

Spring Valley  
 Washington, D.C.



**Legend**

-  ESQD - 197 Feet (Based on a 4.7-inch Mk1 Shrapnel Round)
-  ECS Structure
-  Property Boundaries
-  Buildings
-  Deck/Porch
-  Elevation Contours



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**PARSONS**

